

$$\textcircled{5} \left(\sqrt{5+2\sqrt{6}} \right)^2 = \left(\sqrt{2+\sqrt{3}} \right)^2$$

$$5+2\sqrt{6} = 2 + 2\sqrt{6} + 3$$

$$5+2\sqrt{6} = 5+2\sqrt{6}$$

$$\textcircled{7} \sqrt[5]{x^{-3} \sqrt[3]{x^4} \sqrt{x^{-5}}} = \sqrt[5]{x^{-3} x^{4/3} x^{-5/2}}$$

$$= (x^{-3} x^{4/3} x^{-5/2})^{1/5}$$

$$= x^{-3/5} x^{4/15} x^{-1/2}$$

$$= x^{-18/30} x^{8/30} x^{-15/30} = x^{-5/6}$$

$$\sqrt[6]{\frac{1}{x^5}} \cdot \frac{\sqrt[6]{x}}{\sqrt[6]{x}} = \frac{\sqrt[6]{x}}{x}$$

$$\textcircled{3} \ a) \ \sqrt[3]{\sqrt{2} \sqrt{2} \sqrt{2}}$$

$$\sqrt[3]{\sqrt{x}} = \sqrt[6]{x}$$

$$\sqrt[3]{\sqrt{2} \sqrt{2} \cdot 2^{1/2}}$$

$$\sqrt[3]{\sqrt{2} \sqrt{2^{3/2}}}$$

$$\sqrt[3]{2(2^{3/2})^{1/2}}$$

$$= \sqrt[3]{2 \cdot 2^{3/4}} = \sqrt[3]{2^{7/4}}$$

$$= (2^{7/4})^{1/3}$$

$$= 2^{7/12} = \sqrt[12]{2^7} = \sqrt[12]{128}$$

$$\begin{aligned}
 3 \text{ b) } \sqrt[3]{\sqrt[4]{ab^2} \sqrt[4]{a^3b^2}} &= \sqrt[3]{\sqrt[4]{ab^2} \cdot (a^3b^2)^{1/4}} \\
 &= \sqrt[3]{\sqrt[4]{ab^2} \cdot a^{3/4} b^{1/2}} \\
 &= \sqrt[3]{\sqrt[4]{a^{7/4} b^{5/2}}} \\
 &= \sqrt{(a^{7/4} b^{5/2})^{1/3}} = \sqrt{a^{7/12} b^{5/6}} \\
 &= a^{7/24} b^{5/12} = a^{7/24} b^{10/24} \\
 &\quad \sqrt[24]{a^7 b^{10}}
 \end{aligned}$$

$$\begin{aligned}
 a) \left(\frac{125}{125^{-1/3}} \right)^{-1/4} &= \left(\frac{125^{-1/3}}{125} \right)^{1/4} = \left(\frac{\left(\frac{1}{125} \right)^{1/3}}{125} \right)^{1/4} \\
 &= \left(\frac{\frac{1}{5}}{125} \right)^{1/4} = \left(\frac{1}{5} \cdot \frac{1}{5^3} \right)^{1/4} \\
 &= \left(\frac{1}{5^4} \right)^{1/4} = \frac{1}{5}
 \end{aligned}$$